LIFE DOP - Demonstrative mOdel of circular economy Process in high quality dairy industry

DURATION: Start**: 01/09/16 - End: 28/02/2021**

PROJECT'S IMPLEMENTORS:

Coordinating Beneficiary: Consorzio Latterie Virgilio

Associated Beneficiary(ies): Associazione Mantovana Allevatori, Cooperativa San Lorenzo Soc. Agr. Coop, Consorzio Agrario del Nord Est, Università degli Studi di Milano, Consorzio Gourmi.it

Partners

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ITALIANO DA SEMPRE

ASSOCIAZIONE MANTOVANA ALLEVATORI

coop agricola San Lorenzo

CONSORZIO AGRARIO DEL NORDEST

gourmit

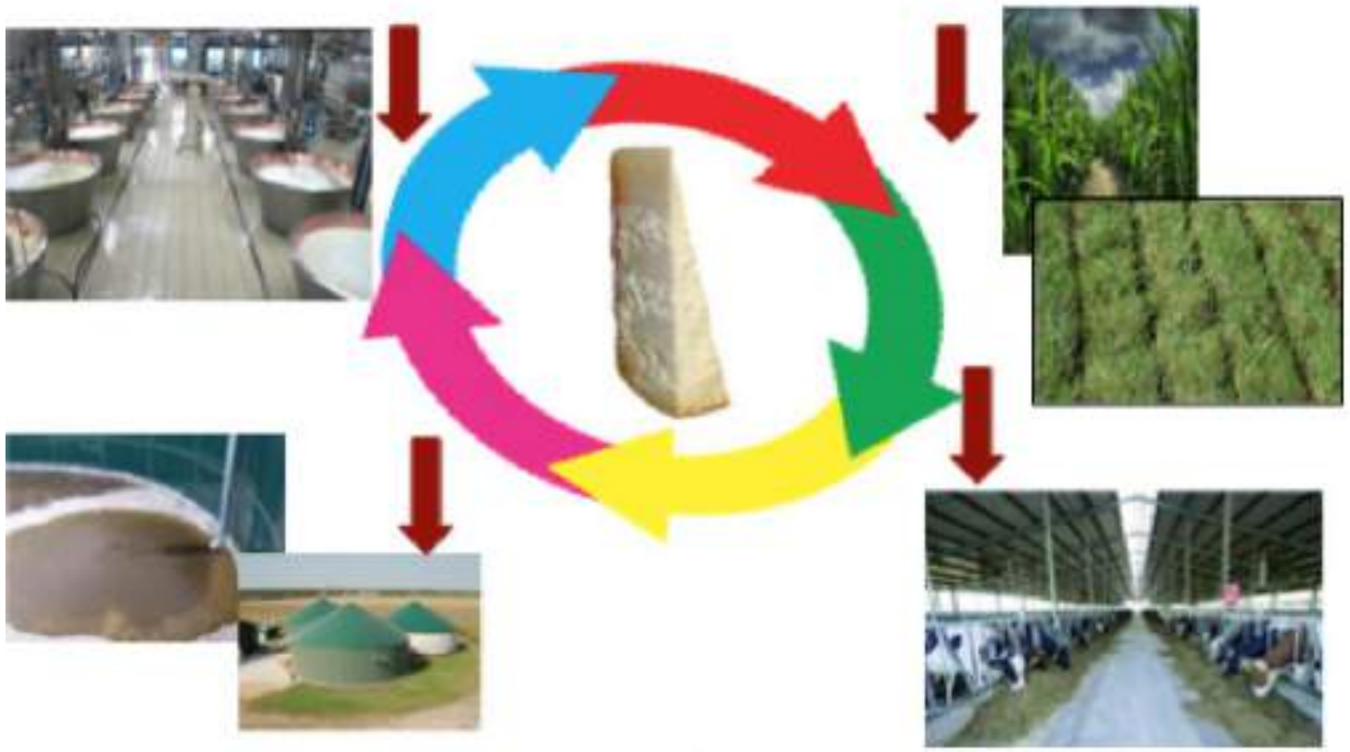
UNIVERSITÀ DEGLI STUDI DI MILANO

What is sustainability for LIFE DOP

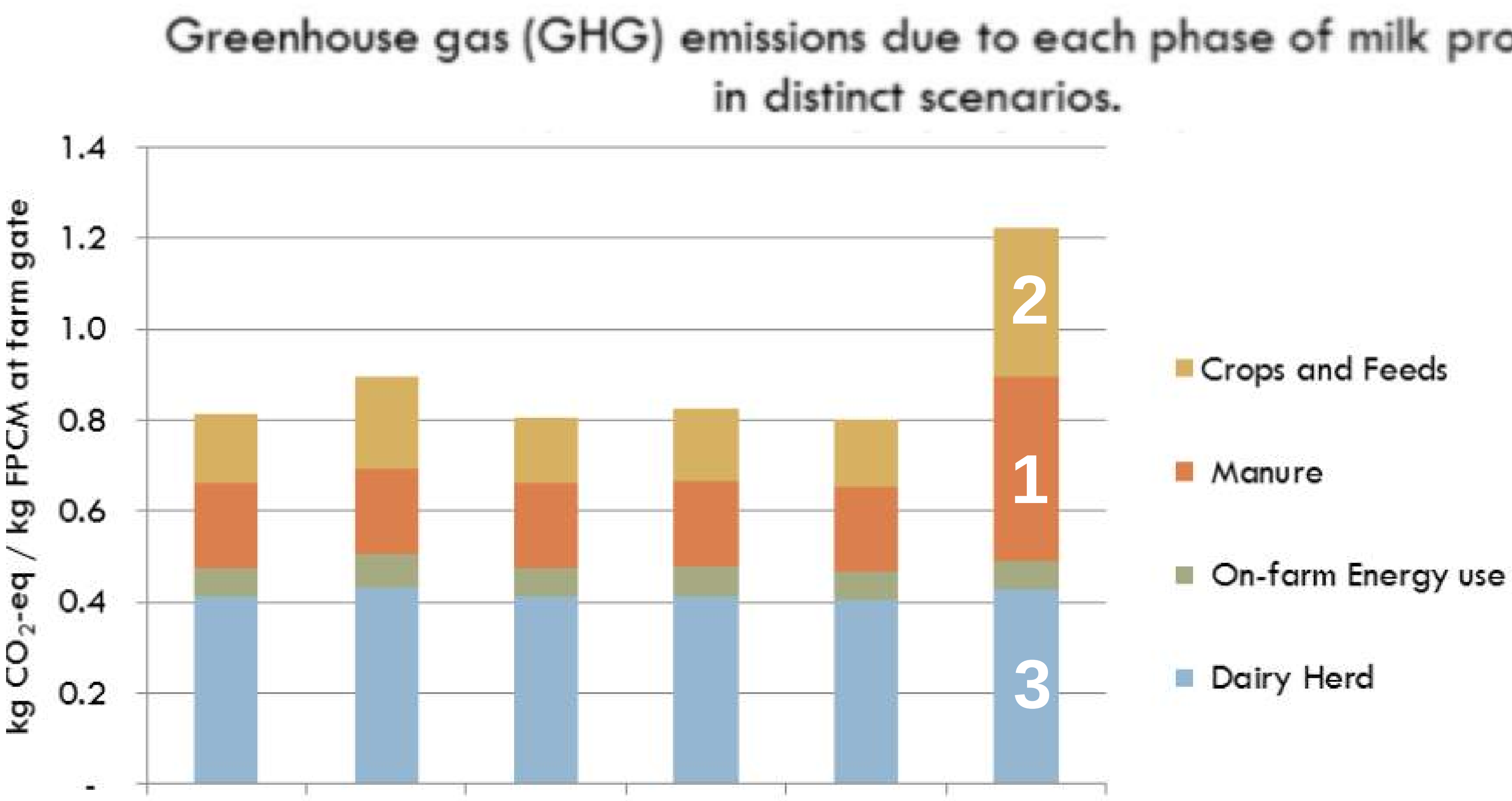
Produce more value by less input

Valorizing each single step and actor of the production chain

Technology and innovation
Good practices
Training
Territory and society



What cause impact on environment in dairy production



What LIFE DOP project aims to improve

1) Slurry –manure management (decreasing emission to air and water)

2) Fertilization and nutrient management

3) Stables management

4) dairies management

LIFE DOP model on ground

Valorisation of slurry in the biogas sector replacing maize (food security)

Virtuous management of digestate in the field and reduction of mineral fertilization (circular economy). Production of renewable fertilizers to be exported also outside the district

Production of fodder with low environmental input (minimum tillage in the field, increase in carbon stock, reduction of emissions etc.)

Best practices in stables management: optimized rationing, slurry proper management

Optimization of production steps in dairy: management audit, identification of critical points for improvement

Total calculation of model impacts by LCA (Life Cycle Assessment)

Improvement 1: slurry management, action B1-B2-B3

Slurries from stables are sent to produce biogas and renewable energy

Digestate is used as renewable organic fertilizer, in place of chemical fertilizers
15.000 tons exported to non livestock areas

Action B1

Slurry-manure exchange platform

B1: Slurry manure exchange platform

Aims: to exploit slurry, manure and slurry-manure derived fraction to produce bioenergy, i.e. to send the materials to anaerobic digestion plants

to export the solid fraction of digestate (and some amount of separated solid fraction of slurry) as fertilizer outside the district (e.g. in horticulture, organic farming company or winery),

to rebalance the nitrogen load and to reduce environmental impacts.

B1: results

Since the start of the project:

27 million kwh renewble energy produced by slurry manure derived fraction from the plants involved in the manure stock exchange platform

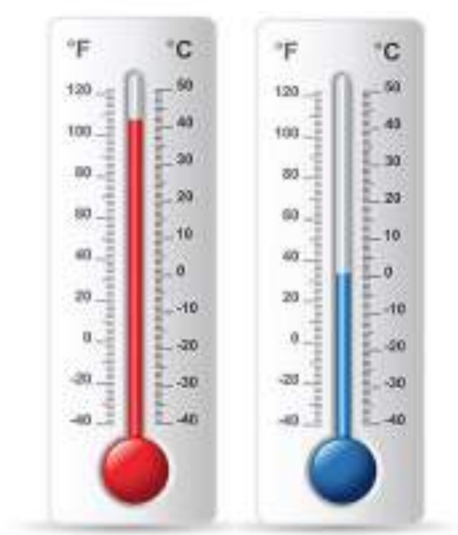
B1: results

Since the start of the project:

700 CH_4 tons of avoided emission thanks to proper managing of slurry-manure

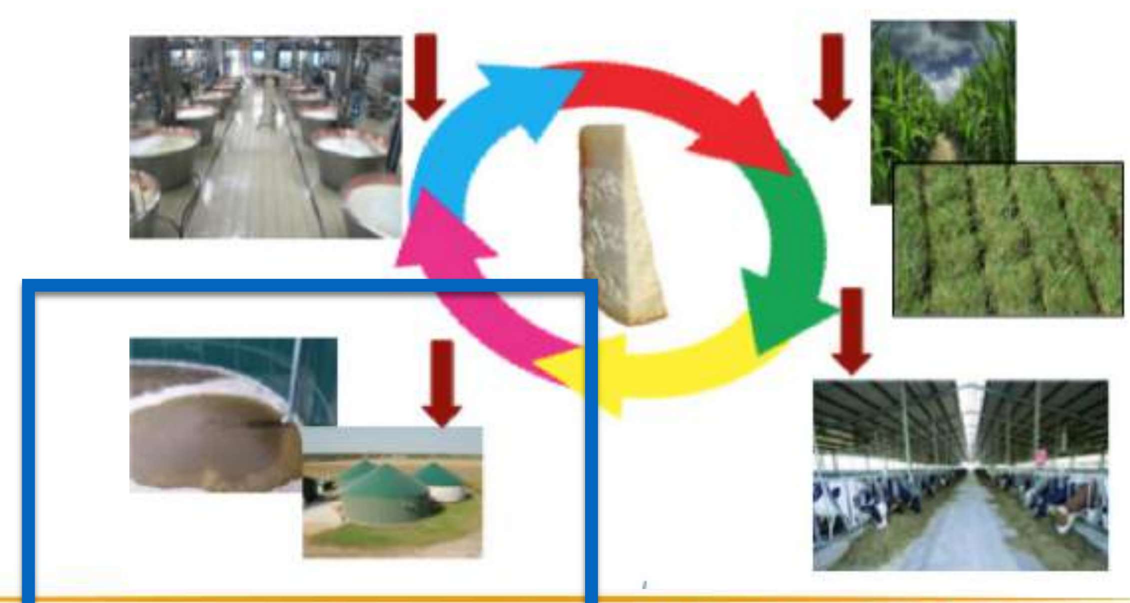
16.000 tons CO_2 eq tons of avoided emission due to renewable energy and avoided methane emission

B1: Contribution to the sustainability of dairy production chain



-5-13% of Climate change impact categories on the unit of cheese

action B1-B2_B3



Action B2

Pre-treatment of slurry-manure by hydrodynamic cavitation technique

B2: Objectives

Action B.2: Pre-treatment of slurry by hydrodynamic cavitation technique. Design realization and set up of prototype.

Foreseen start date:	September 2016	Actual start date:	1 September 2016
Foreseen end date:	February 2021	Actual (or anticipated) end date:	30 January 2021

Objectives

Design and build up a mobile prototype to treat manure and slurry and make them suitable for anaerobic digestion. The prototype has several purposes: it cleans up the manure, removing any metals or stones, which are often present in it; it grinds, homogenizes and chops the material finely (cavitate), making it suitable for biogas plants, even when the plants are not equipped for solid loading. The prototype has been completed and is now treating material that is sent to one biogas plant (see action B3). **The activity suffered delay in the realization of prototype.**

B2 : Results

Realization of prototype 2-12-2017

Action B3

Use of slurry/manure-derived fraction in anaerobic digestion plants

B3 : Objectives

Action B.3: Use of slurry/manure-derived fraction in anaerobic digestion.

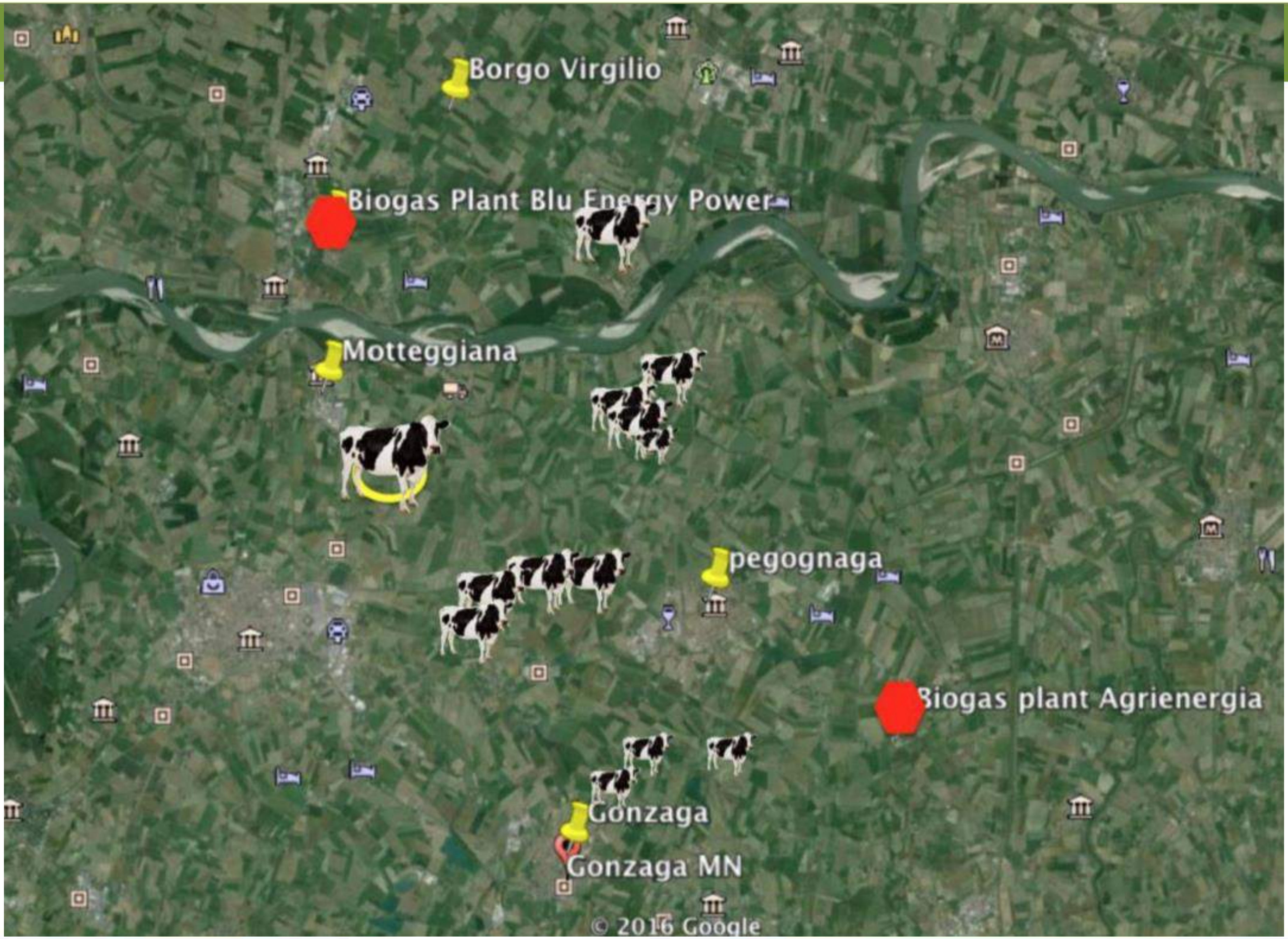
Foreseen start date:	September 2016	Actual start date:	3 September 2016
Foreseen end date:	February 2021	Actual end date:	28 February 2021

Objectives

The activity foresees to monitor 2 biogas plants when silage maize is replaced with slurry and slurry-manure derived fractions, i.e. **separated solid fraction of slurry**, shredded **manure** and **cavitated slurry-manure mix,** in order to understand what kind of difficulties and advantages may arise.

B3 : results

Results foreseen according project proposal
70% of the silage maize for the feeding of the monitored biogas plants is replaced with slurry–manure-derived fraction in biogas plants.
20.000 tons/year of silage maize will be replaced by slurry-manure derived fraction.
The CO_2 emission of the MWh of energy produced in the biogas plant decrease thanks to maize replacement from 321 kg CO_2 eq to 257 kg CO_2 eq. (baseline for plant is actually higher than previously forseen)


Borgo Virgilio
Biogas Plant Blu Energy Power
Motteggiana
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Biogas plant Agrienergia
Gonzaga
Gonzaga MN
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Improvement 2: Field management (action B4)

Virtuous and innovative management of digestate and slurry in the fields: injection and fertigation

Strong reduction of chemical fertilizer

Conservative agriculture practices that preserve soil quality: minimum tillage

Benefits

Improved air quality: reduction of ammonia emissions into the atmosphere.

Saving of fossil fuels to produce synthetic fertilizers

Better soil quality and biodiversity.

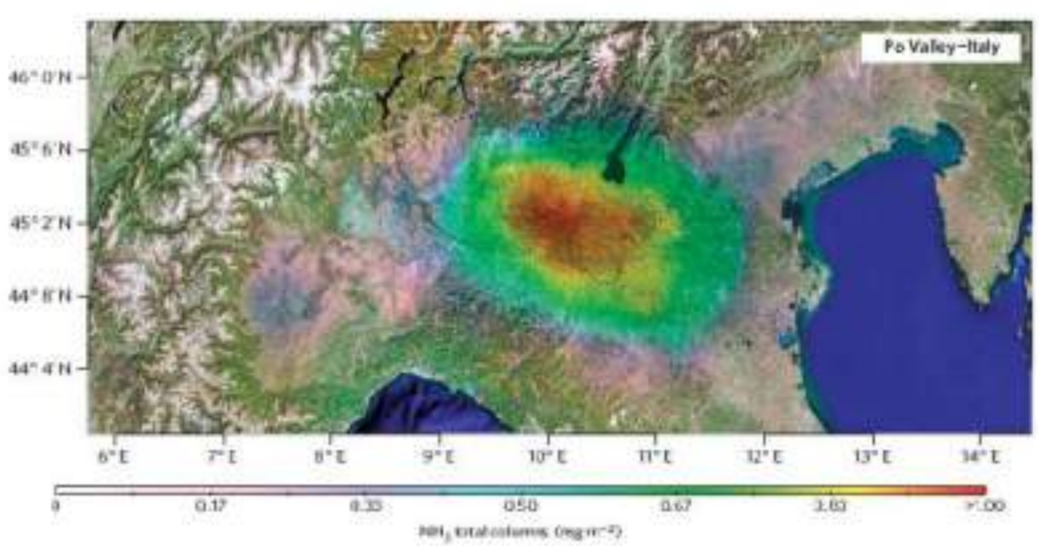


Figure 2 - Annual averaged NH_3 columns over three agricultural valleys (Clarisse et al., 2009).

Action B4

Sustainable and effective management of nutrients and carbon

B4 : Objectives

Action B.4: Sustainable and effective management of nutrients and carbon.

Foreseen start date:	September 2016	Actual start date:	19 September 2016
Foreseen end date:	February 2021	Actual end date:	28 February 2021

Objective

In this action are joined different activities relating to the proper and sustainable management of nutrients and carbon: i) practices to use solid and liquid fraction of digestate are tested, to reduce environmental impacts; ii) the monitoring of denitrification pilot system for the liquid fraction of digestate, iii) the use of drone to implement a biological control system against the European corn borer (Ostrinia nubilalalis).

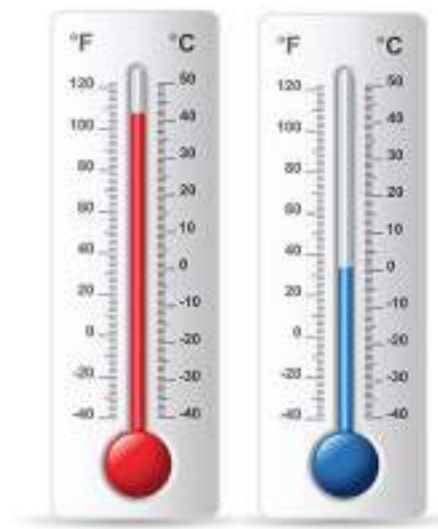
B4 : Results

Decrease of the use of synthetic fertiliser in agronomic trials, respect to reference practices

Decrease the total nitrogen introduced into the system by 40%
Reduction of ammonia emissions by 40% to 60% compared to the reference practices in the agronomic trials

Impacts and Contribution to the sustainability of dairy production

-40% in total N input in the system
-60% ammonia emission



Implementation: demo activity, real implementation is foreseen once farmers appply to the certification scheme that will be presented

Action B5

Optimization of feeding mix and managing practices for stables.

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Improvement 3: stable management

Detection of the state of the art (ration, fodder use, management of slurry)

Evaluation of economic and environmental efficiency

Identification of improvement points and feedback to stables

B5 : objectives

Action B.5: Optimization of feeding mix and managing practices for stables.

Foreseen start date:	September 2016	Actual start date:	27 September 2016
Foreseen end date:	February 2021	Actual (or anticipated) end date:	28 February 2021

Objective

Collect data about stables management, picture the state of the art of Grana Padano and Parmigiano Reggiano production, elaborate data and outline weak points, propose optimisation procedures to improve sustainability.

Structure of the action

The working flow of the action was:

Detect the state of the art of 90 farms

Cluster farms in 3 groups: low, medium, good performer(climate change mean value 1.19 kg CO_2 eq/kg FPCM)

Outline the structure and implemented practices of the 10 best performing farms

Outline week areas in the others

Suggest best practices to all (feedback to the farmers in one to one talks)

Follow 10 pilots farms step by step according their week points

B5 :Results

Farm improvements cannot be achieved fastly and easily (farm, animal and seasonal variability) but need time and monitoring → Further improvements are expected

CC: +5% -5%

The **best farms** show reduced variations so it is more difficult to achieve an improvement

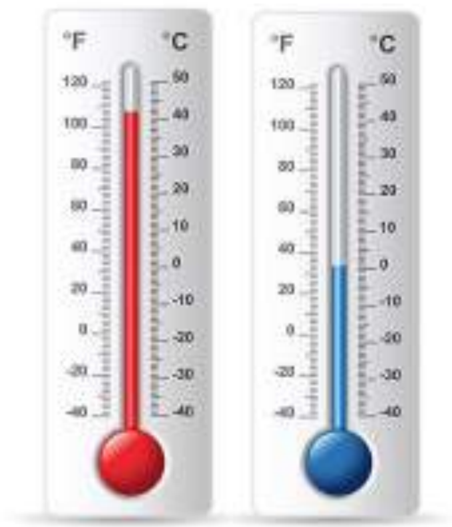
CC: +10% -5%

The **mean farms** show the best results and a good range and potential of improvment

CC: +10% -15%

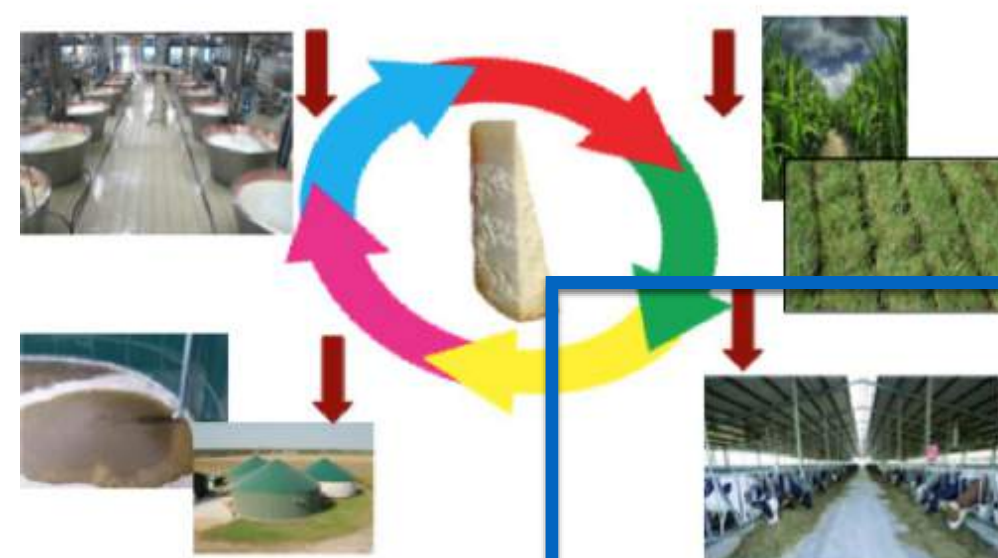
The **worst farms** have good potential of improvement but results are often difficult to be achieved

B5: Contribution to the sustainability of dairy production chain



-7% Climate change due to the increase in dairy efficiency (implemented in some of the pilot farms)

One to one feedback to farmers, demonstration activity are intended to widen implementation of good practice



Action B6

Optimization of the environmental performance of dairies

Improvement 4: dairies management

Audit in dairies

Evaluation of Carbon-footprint

Comparison with benchmarks

Operative plans to improve the sustainability of the process

B5 : Expected Results

Operational plan to 8 dairies to decrease by 10% the average impact of the dairies.

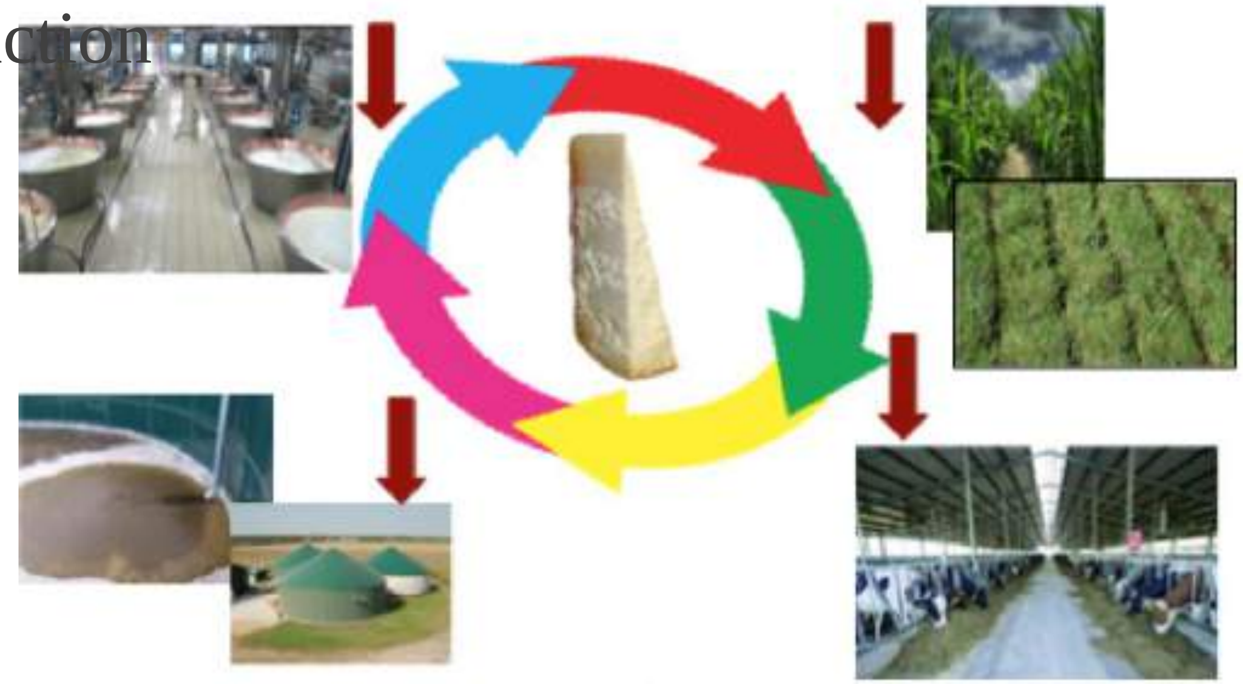
All the managing procedures were implemented

infrastructure investments on the way

Contribution to the sustainability of dairy production

-1% Climate change
B6 action
Implemented in
part of the production
chain

-60% ammonia emission
B4 action
Implemented in Demofield



-5-13% Climate change
B1-B2B3 actions
Implemented in part of the
production chain

-7%-11% Climate change
B5 action
Implemented in pilot farms

Calculation of the existing environmental impact (verification of current status and LCA calculation)

Measurement of the impact of the sustainable model on a demonstration scale (demofield, field measurements)

Definition of the constraints and good practices to be followed .

Implementation and EPD certification

LIFE DOP: numbers in a nutshell

180.000 tons of slurry and slurry derived fractions sent to biogas plants

27millio kwh of renewable energy produced

26.000 tons eq CO_2 saved

15.000 tons of organic fertilizer sent outside the district

30 ha of demofield to test best practices (minimum tillage, digestate injection etc..)

180 audits in farms

LIFE DOP: events

PRODUZIONI AGROZOOTECNICHE: DAI PIANI FORAGGERI ALLA GESTIONE DELL'ALLEVAMENTO E DEI REFLUI

I progetti life raccontano nuove pratiche di sostenibilita'

17 Gen. 2020 · ore 10:00
Sala workshop - Padiglione 0
Fiera Millenaria di Gonzaga,
Gonzaga (MN)

Sistemi foraggeri e mitigazione dell'impatto ambientale della produzione di latte.
Anna Sandrucci, DISAA Università degli Studi di Milano. Progetto LIFE Forage 4 Climate

Il ruolo dell'industria mangimistica, sostenibilità e valorizzazione delle risorse.
Federico Froldi, DIANA Università Cattolica del Sacro Cuore Piacenza. Progetto LIFE TTGG

Il modello LIFE DOP: gestione della stalla e degli effluenti per diminuire gli impatti ambientali
Stefano Garimberti, ARAL. Progetto LIFE DOP

Il refluo come risorsa: tecniche di fertirrigazione con digestato a confronto nel progetto LIFE ARIMEDA
Viviana Guido, DISAA Università degli Studi di Milano. Progetto LIFE ARIMEDA

Primi risultati dell'applicazione della "PEFCR" for Dairy Products" sulla realtà del Grana Padano DOP.
Pieter Ravaglia, Department of Energy Politecnico di Milano. Progetto LIFE TTGG.

Thank you for your attention

VISITA IL NOSTRO SITO: WWW.LIFEDOP.EU

Per contatti

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